

Amendments to the Claims

This listing of claims replaces all prior versions, and listings, of claims in the present application.

Listing of Claims:

61 1. (currently amended) A data recording clock signal generator that generates a recording clock signal synchronous with a wobble signal used for recording data on an optical disk having a data recording track wobbled by the wobble signal having predetermined frequency components,

said data recording clock generator comprising:

a wobble signal extracting unit that extracts the wobble signal;

a recording clock signal dividing unit that generates a divided clock signal obtained by dividing the frequency of the recording clock signal;

a phase difference signal generating unit that generates a phase difference signal as a result of phase comparison between the wobble signal and the divided clock signal;

a frequency control signal generating unit that generates a frequency control signal based on the phase difference signal generated by the phase difference signal generating unit; and

a recording clock signal generating unit that generates the recording clock signal having a frequency controlled in accordance with the frequency control signal generated by the frequency control signal generator,

wherein

the recording clock signal dividing unit is provided with a frequency dividing rate setting unit that sets a reference frequency dividing rate by which the frequency of the recording clock signal is divided and a frequency dividing rate different from the reference frequency dividing rate, following predetermined

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procedures, and wherein a phase relationship between the wobble signal and the recording clock signal can be changed by a unit smaller than one clock cycle of the recording clock signal each time the frequency dividing rate setting unit changes its setting.

2. (previously presented) A data recording clock signal generator that generates a recording clock signal synchronous with a wobble signal used for recording data on an optical disk having a data recording track wobbled by the wobble signal having predetermined frequency components,

said data recording clock generator comprising:

a wobble signal extracting unit that extracts the wobble signal;

a recording clock signal dividing unit that generates a divided clock signal obtained by dividing the frequency of the recording clock signal;

a phase difference signal generating unit that generates a phase difference signal as a result of phase comparison between the wobble signal and the divided clock signal;

a frequency control signal generating unit that generates a frequency control signal based on the phase difference signal generated by the phase difference signal generating unit; and

a recording clock signal generating unit that generates the recording clock signal having a frequency controlled in accordance with the frequency control signal generated by the frequency control signal generator,

wherein the recording clock signal dividing unit is provided with a frequency dividing rate setting unit that sets a reference frequency dividing rate by which the frequency of the recording clock signal is divided and a frequency dividing rate different from the reference frequency dividing rate, following predetermined procedures, and wherein

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the frequency dividing rate setting unit is provided with a rate selecting unit that changes an order of combination of the reference frequency dividing rate and the different frequency dividing rate every time data recording is performed on the optical disk.

3. (previously presented) A data recording clock signal generator that generates a recording clock signal synchronous with a wobble signal used for recording data on an optical disk having a data recording track wobbled by the wobble signal having predetermined frequency components,

said data recording clock generator comprising:

a wobble signal extracting unit that extracts the wobble signal;

a recording clock signal dividing unit that generates a divided clock signal obtained by dividing the frequency of the recording clock signal;

a phase difference signal generating unit that generates a phase difference signal as a result of phase comparison between the wobble signal and the divided clock signal;

a frequency control signal generating unit that generates a frequency control signal based on the phase difference signal generated by the phase difference signal generating unit;

a recording clock signal generating unit that generates the recording clock signal having a frequency controlled in accordance with the frequency control signal generated by the frequency control signal generator, wherein the recording clock signal dividing unit is provided with a frequency dividing rate setting unit that sets a reference frequency dividing rate by which the frequency of the recording clock signal is divided and a frequency dividing rate different from the reference frequency dividing rate, following predetermined procedures;

a synchronous detection unit that detects a synchronizing signal superimposed on the wobble signal;

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a synchronous relationship judgment unit that judges the synchronous relationship between the detected synchronizing signal and recording data to be recorded on the optical disk; and

a control unit that controls an average value of the frequency dividing rate set in the recording clock dividing unit to be greater than the reference frequency dividing rate when the synchronous relationship judgment unit judges that the recording data lags behind the detected synchronizing signal, and also controls the average value of the frequency dividing rate to be smaller than the reference frequency dividing rate when the synchronous relationship judgment unit judges that the recording data is ahead of the detected synchronizing signal.

4. (currently amended) A data recording clock signal generator that generates a recording clock signal synchronous with a wobble signal used for recording data on an optical disk having a data recording track wobbled by the wobble signal, which has predetermined frequency components, and on which address information and a synchronizing signal are phase-modulated and superimposed, a groove of the data recording track being formed on the optical disk in a phase-modulated manner,

said data recording clock signal generator comprises:

a wobble signal extracting unit that extracts the wobble signal;

a recording clock signal dividing unit that generates a divided clock signal obtained by dividing a frequency of the recording clock signal;

a phase difference signal generating unit that generates a phase difference signal as a result of a phase comparison between the wobble signal and the divided clock signal;

a frequency control signal generating unit that generates a frequency control signal based on the phase difference signal generated by the phase difference signal generating unit;

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a recording clock signal generating unit that generates the recording clock signal having a frequency controlled in accordance with the frequency control signal generated by the frequency control signal generating unit; and

a masking unit that generates a phase comparison mask signal to prevent that prevents the phase difference signal generating unit from generating the phase difference signal, said mask signal being generated at a portion of the wobble signal on which either the address information or the synchronizing signal is phase modulated and superimposed at any timing when either the address information or the synchronizing signal is phase modulated on the optical disk.

5. (original) A data recording clock signal generator that generates a recording clock signal synchronous with a wobble signal used for recording data on an optical disk having a data recording track wobbled by the wobble signal having predetermined frequency components,

said data recording clock signal generator comprising:

a wobble signal extracting unit that extracts the wobble signal;

a recording clock signal dividing unit that generates a divided clock signal obtained by dividing a frequency of the recording clock signal;

a phase difference signal generating unit that generates a phase difference signal as a result of a phase comparison between the wobble signal and the divided clock signal;

a first frequency control signal generating unit that generates a first frequency control signal based on the phase difference signal generated by the phase difference signal generating unit;

a wobble signal dividing unit that divides a frequency of the wobble signal at a predetermined frequency dividing rate;

a wobble signal cycle counting unit that counts cycles of the divided wobble signal by the cycle of the recording clock signal;

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a second frequency control signal generating unit that generates a second frequency control signal based on the number of cycles counted by the wobble signal cycle counting unit; and

a recording clock signal generating unit that generates the recording clock signal having a frequency controlled in accordance with the first frequency control signal when the number of cycles counted by the wobble signal cycle counting unit is within a predetermined range, and generates the recording clock signal having a frequency controlled in accordance with the second frequency control signal when the number of cycles counted by the wobble signal cycle counting unit is outside the predetermined range.

6. (original) The data recording clock signal generator as claimed in claim 5, wherein

the recording clock signal generating unit generates the recording clock signal having the frequency controlled in accordance with the first frequency control signal when the number of cycles counted by the wobble signal cycle counting unit is within the predetermined range, and generates the recording clock signal having the frequency controlled in accordance with the second frequency control signal when the number of cycles counted by the wobble signal cycle counting unit is determined to be outside the predetermined range a predetermined consecutive number of times.
